NASA
Spaceport Engineering and Technology Directorate
Labs and Testbeds Division
Kennedy Space Center, Florida

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SUBJECT: WSB GN2 Contamination

CUSTOMER: John Schmitz/USA/USK-356

1.0 REQUEST

Identify particulate and non volatile residue(NVR) present on swabs and parts provided.

2.0 PROCEDURE

The samples were analyzed by transmission Fourier transform infrared spectroscopy(FT-IR),and scanning electron microscopy with energy dispersive spectroscopy(SEM/EDS).

3.0 RESULTS

3.1 FT-IR--- All swab samples showed trace levels of hydrocarbons. The two filter assembly's showed a lubricant on the threads which is consistent with that of a fluorinated material such as Krytox. OPF bay 2 filter assembly also showed trace of hydrocarbon.

3.2 SEM/EDS

Twelve samples submitted consisted of a 10 cotton swabs and two fittings. Analyses of particulates removed from the swabs and fittings was performed using scanning electron microscopy, energy dispersive spectroscopy (SEM/EDS). Analyses of the samples are as follows:
WSB1-PD28 Cap - Moderate quantity of shiny metallic flakes containing high iron, chromium, nickel, with minor amounts of calcium, sulful, silicon, oxygen, carbon, and manganese. These appear to be a 300 series stainless steel, but the chromium is a bit higher than most of that series stainless steel.

3.2 SEM/EDS

WSB1-PD28 Poppett - Just a few metallic flakes but the same composition as described for specimen 1 (above).

WSB1-PD30 Cap - Heavy amounts of metallics. Same compositions described for specimen 1 (above).

WSB2-PD30 Poppett - Just a few metallic flakes, same as above.

WSB3-PD32 Cap - Heavy amounts of metallic particulates, same composition as above.

WSB3-PD32 Poppett - A few metallic particulates were observed but they were too small to analyze by SEM/EDS.

Bay 1 QD Threads - Moderate metallic particles, same composition as above. The amount of silicon was slightly higher.

Bay 1 45 degree Elbow - A few metallics, same composition as sample 7 above.

OPF Bay 2 Elbow Threads - Lots of material and metallics, metallics are same as analyzed above, but high fluorine level is indicative of the presence of fluorocarbon grease.

OPF Bay 2 - 45 Degrees Elbow - A few metallic flakes were observed, same composition as observed in Sample 1 (above).

OPF Bay 1 Filter Assembly - A very clean sample no metallic flakes observed.

OPF Bay 2 Filter Assembly - Heavy amounts of debris, mostly high fluorine which may mask metallic flakes. Other elemental contamination included high carbon, chlorine, silicon, aluminum, carbon, and oxygen with traces of zinc, iron, titanium, calcium sulfur aluminum and sulfur.

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Equipment:

Bio-Rad model 575C Fourier-Transform Infrared Spectrometer. MSL –Cal. 0180.

The SEM is a Cambridge Model lS-200 instrument, Serial Number 5069, The EDS system is an Oxford Instruments ISIS unit, Serial Number 29228, Calibration Number 0135.

Primary Investigator: _____
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